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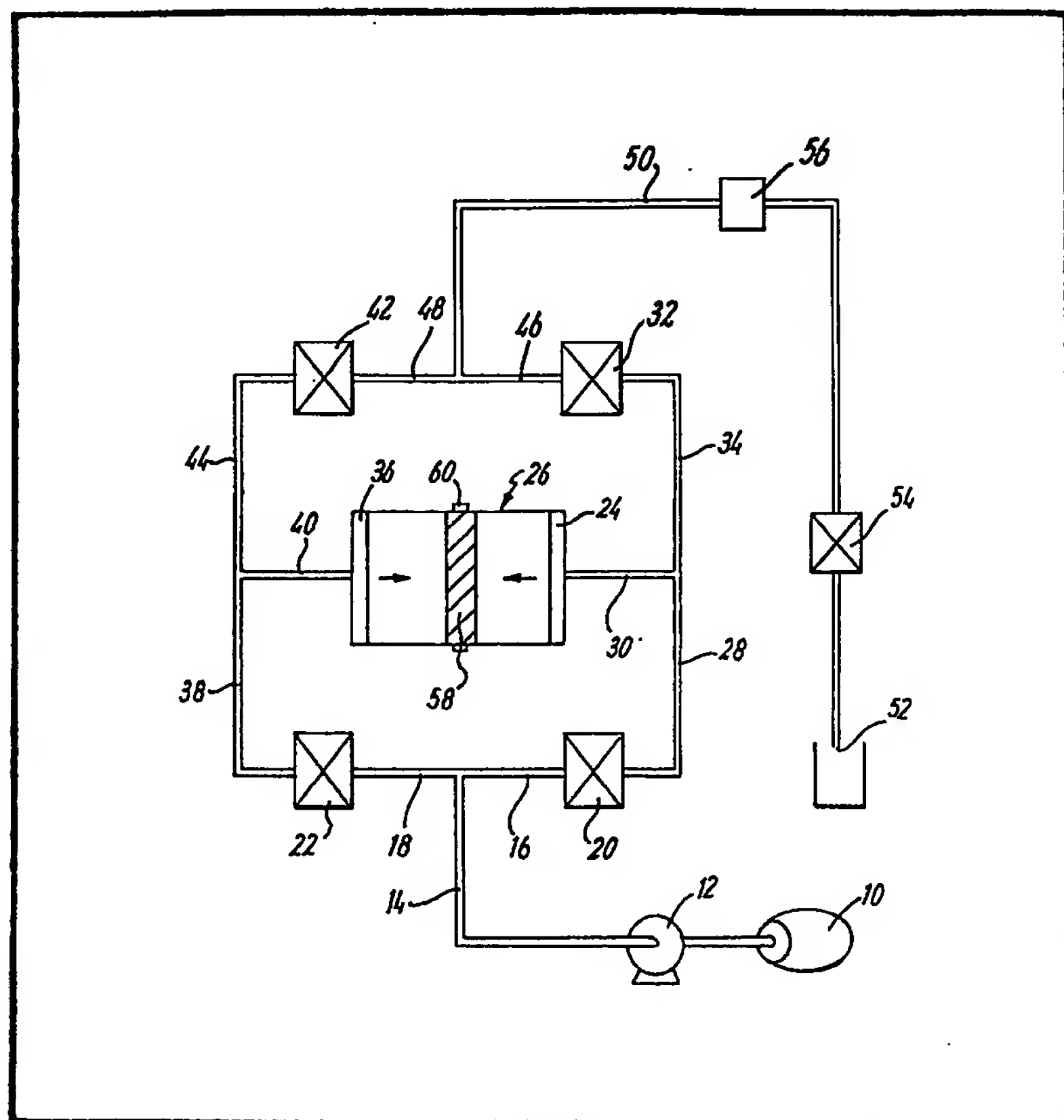
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(54) Liquid metering apparatus

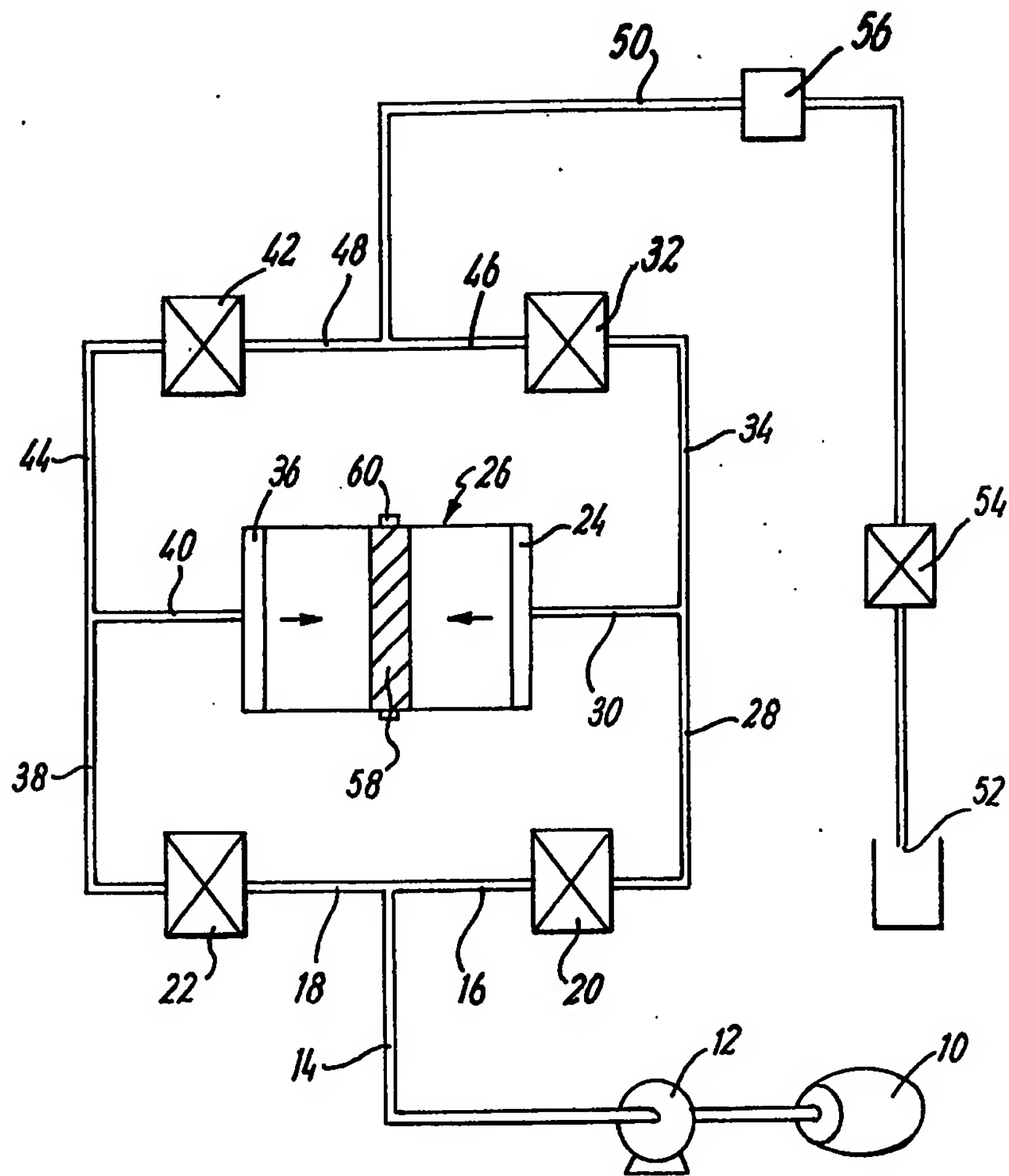
(57) A beer dispensing apparatus includes a metering cylinder (26) with associated valves (20, 22, 32, 42) in circuit between a supply (10) and a dispense outlet (52) controlled by a bar valve (54). A piston (58) is displaceable in the cylinder (26) and carries out a double sweep for each dispense. Change of direction of movement of the piston (58) is

controlled by a flow switch (56) which senses arrival at each end of the cylinder. The piston (58) commences movement from a location between the ends of the cylinder (26) and movement past a position sensitive switch (60) in one direction causes the latter to close the bar valve (54). The piston (58) continues to move slightly to pressurise the delivery line and further movement will always be in the correct direction by use of the switch (60).



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SPECIFICATION

Improvements in or relating to metering apparatus for dispensing liquids

This invention is concerned with improvements
 5 in or relating to metering apparatus for dispensing liquids and is particularly concerned with the dispensing of potable carbonated liquids for example lager or other highly carbonated beers.

Metering systems have been previously
 10 proposed which include a metering cylinder provided with a reciprocable piston with the system being arranged to retain the liquid downstream of the cylinder under pressure after the dispensing outlet has been closed so that
 15 carbon dioxide is prevented from being expelled from the liquid and therefore the formation of fob is prevented. One such previously proposed system uses a flow switch to reverse the direction of travel of the piston in the metering cylinder
 20 with the flow switch also being operable to close the dispensing outlet, a slight movement of the piston in the reverse direction then being effected to maintain the pressure downstream of the cylinder. Such a system can present problems,
 25 particularly in ensuring that on restart the piston moves in the correct direction as otherwise short measures will be dispensed.

According to the present invention there is
 30 provided apparatus for dispensing a metered quantity of a liquid, said apparatus comprising means defining a liquid chamber within which a liquid displacing member is reciprocally located, line means effecting communication between a source for supply of the liquid and the chamber at
 35 each of two locations therein and between each of said two locations and a dispensing outlet, and a control arrangement which includes valve means in said line means for controlling passage of liquid therethrough, means for sensing, during
 40 dispensing when the outlet is open, the arrival of the member at each end of its travel to enable the direction of travel to be reversed, and switch means positioned between the ends of travel of the member for sensing arrival of the member at
 45 the switch means and enabling closing of the outlet.

Preferably the switch means senses arrival of the member when the latter moves in only one of its travel directions, the member moving through
 50 twice its travel path during dispense of each metered quantity of liquid

Preferably also the control arrangement includes a pump, operation of which is continued for such a period after closing of the outlet that
 55 the liquid in the line means downstream of the chamber is maintained under desired pressure.

An embodiment of the present invention will now be described by way of example only with reference to the single figure of the accompanying
 60 drawing, which is a diagrammatic view of an apparatus according to the invention.

Referring to the drawing, apparatus for dispensing lager or other highly carbonated beers from a supply 10 includes a pump 12 having its

65 inlet connected with the supply 10 and its outlet connected through a first pipe 14 with branch pipes 16, 18 communicating with inlets of valves 20, 22 respectively. The valve 20 communicates with one end 24 of a metering cylinder 26
 70 through pipe sections 28, 30. The end 24 of the cylinder 26 also communicates with a further valve 32 via the pipe section 30 and a further pipe section 34. Similarly the valve 22 communicates with the other end 36 of the metering cylinder 26
 75 through pipe sections 38, 40 and the end 36 of the cylinder 26 communicates with a further valve 42 through the pipe section 40 and a further pipe section 44. The valves 32, 42 are connected to branch pipes 46, 48 respectively
 80 which join with a further pipe 50 leading to a dispense outlet 52 located for example at a bar. In the pipe 50 upstream of the outlet 52 there is provided a bar valve 54 and a flow switch 56.

Within the metering cylinder 26 there is
 85 located a liquid displacing piston 58 which is reciprocable between the ends 24, 36 of the cylinder 26 to displace the liquid from the respective end thereof. Externally located on the cylinder 26, at a location substantially midway along the length thereof, is an electromagnetic
 90 switch 60, the piston 58 being formed of such a material as to influence the switch 60 when the piston 58 passes the location thereof.

The apparatus is provided with an electronic
 95 control circuit in which are electrically connected the metering valves 20, 22, 32 and 42, the bar valve 54, a push button dispense switch (not shown) at the dispense outlet 52, the flow switch 56, and the position sensitive switch 60.

100 At the start of its operating cycle, the apparatus has the piston 58 positioned substantially at the location of the switch 60. When the push button dispenser switch is manually operated, the control circuit operates to
 105 open bar valve 54 and the metering valves 22, 32, and the pump 12 is operated, whereby the liquid is pumped through the pipes 14, 18, 38, 40, into the metering cylinder 26 to move the piston 58 in the direction 'X' and thus displace liquid from the cylinder 26 through the pipes 30,
 110 34, 46 and 50 and through the dispensing outlet 52. When the piston 58 reaches the end 24 of the cylinder 26, the flow is stopped and this is sensed by the flow switch 56 which operates to cause
 115 the control circuit to close the metering valves 22, 32 and open the other metering valves 20, 42. Thereby the liquid flows through the pipes 14, 16, 28 and 30 into the metering cylinder 26 to move the piston in the reverse direction, i.e. in the
 120 direction 'Y', and thus displace the liquid from the cylinder 26 through the pipes 40, 44, 48, and 50 to the dispense outlet 52. Travel of the piston in the direction 'Y' past the position sensitive switch 60 does not effect operation of the switch 60 as
 125 the latter is designed only to be operated on arrival of the piston in the direction 'X'. As the piston 58 reaches the end 36 of the cylinder 26, flow again stops and is sensed by the switch 56 which then causes the control circuit to re-open

the metering valves 22, 32 and close the valves 20, 42 such that the piston 58 is again moved in the direction 'X'.

When the piston 58, moving in the direction 'X', arrives at the location of the position sensitive switch 60, the latter is operated to cause the control circuit to close the bar valve 54. The metering valves 22, 32 are maintained open for a short period of time, for example a nominal one second, such that the pump 12 pressurises the delivery line to maintain the liquid under a desired pressure. In view of the fact that movement of the piston 58 is only stopped when the latter is moving in the direction 'X', on restart of the dispensing apparatus the control circuit will always ensure that the piston moves in the correct direction such that the slight displacement of the piston 58 after dispensing has stopped in order to pressurise the delivery line, cannot inadvertently cause a short measure to be subsequently dispensed, if for example the piston 58 could be moved in the wrong direction.

It will be appreciated that a double sweep of the metering cylinder 26 by the piston 58 is necessary in order to effect a single dispense and thus the capacity of the metering cylinder 26 need be only one half the capacity of the cylinder of previously proposed systems wherein a piston moves from one end of the cylinder to the other in a single dispense. The apparatus can therefore be made more compact and occupy less space which is obviously a considerable advantage particularly where a plurality of such apparatus are required in the same premises.

It will be appreciated that the absolute position of the position sensitive switch 60 is not significant in order to achieve a full, accurate swept volume of liquid.

Various modifications may be made without departing from the invention. For example three-way metering valves may be used whereby only one pair of valves would be necessary in place of the four metering valves as described and shown. The position sensitive switch may be other than electromagnetic, for example electroptical.

Whilst endeavouring in the foregoing Specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to whether or not particular emphasis has been placed thereon.

Claims (Filed on 19 July 1983)

1. Apparatus for dispensing a metered quantity of a liquid, said apparatus comprising means defining a liquid chamber within which a liquid displacing member is reciprocably located, line means effecting communication between a source for supply of the liquid and the chamber at each of two locations therein and between each of said two locations and a dispensing outlet and a control arrangement which includes valve means in said line means for controlling passage of liquid therethrough, means for sensing, during dispensing when the outlet is open, the arrival of the member at each end of its travel to enable the direction of travel to be reversed, and switch means positioned between the ends of travel of the member for sensing arrival of the member at the switch means and enabling closing of the outlet.

2. Apparatus according to claim 1, wherein the switch means senses arrival of the liquid displacing member when the latter moves in only one of its travel directions, the member moving through twice its travel path during dispense of each metered quantity of liquid.

3. Apparatus according to claim 2, wherein the switch means is externally located on the liquid chamber.

4. Apparatus according to claim 3, wherein the switch means comprises an electromagnetic switch and the liquid displacing member is formed of such a material as to be capable of influencing the switch.

5. Apparatus according to claim 3, wherein the switch means comprises an electro-optical switch arranged to be influenced by the movement therepast of the liquid displacing member.

6. Apparatus according to any of the preceding claims, wherein the control arrangement includes a pump, operation of which is arranged to be continued for such a period after closing of the outlet that the liquid in the line means downstream of the chamber is maintained under desired pressure.

7. Apparatus according to any of the preceding claims, wherein the sensing means comprises a flow switch.

8. Apparatus for dispensing a metered quantity of a liquid, substantially as hereinbefore described with reference to the accompanying drawing.